

May 31, 1960

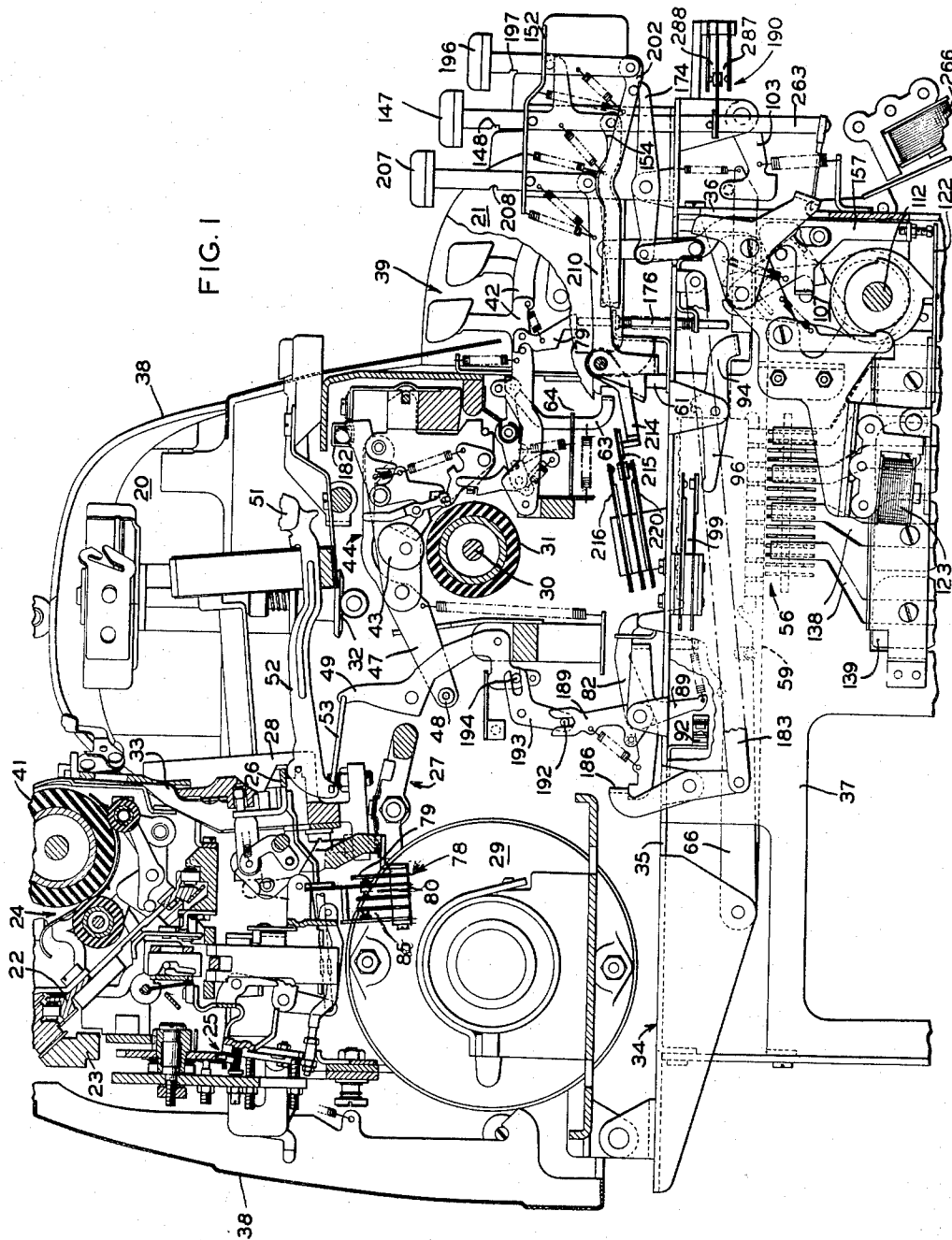
E. O. ROGGENSTEIN

2,938,952

MEANS FOR TYPING, VERIFYING AND PRINTING

Filed Dec. 20, 1954

10 Sheets-Sheet 1



INVENTOR.
EDWIN O. ROGGENSTEIN

BY *J. L. Stulig*

ATTORNEY

May 31, 1960

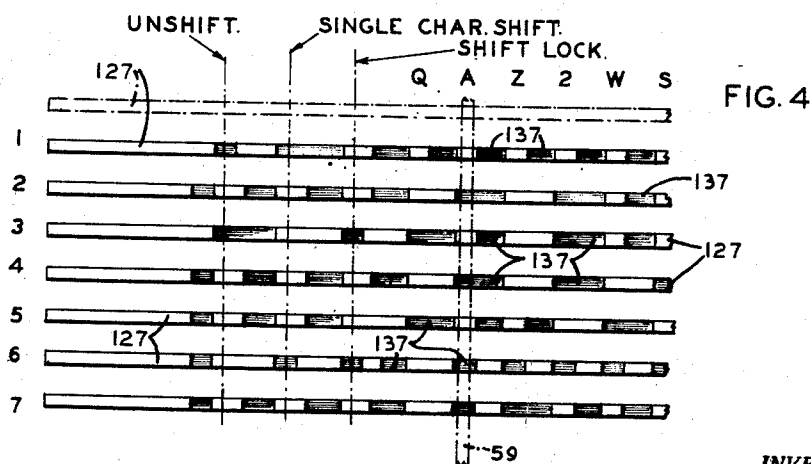
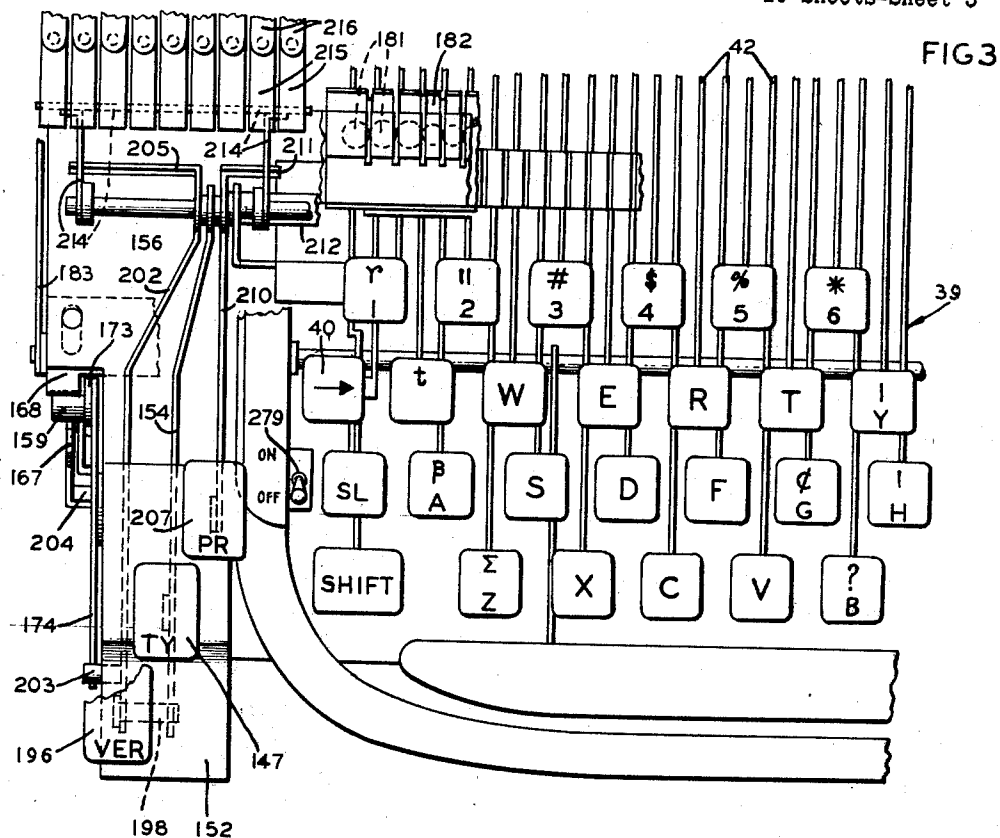
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10 Sheets-Sheet 3



INVENTOR.
EDWIN O. ROGGENSTEIN

BY *J. L. Stelling*

ATTORNEY

May 31, 1960

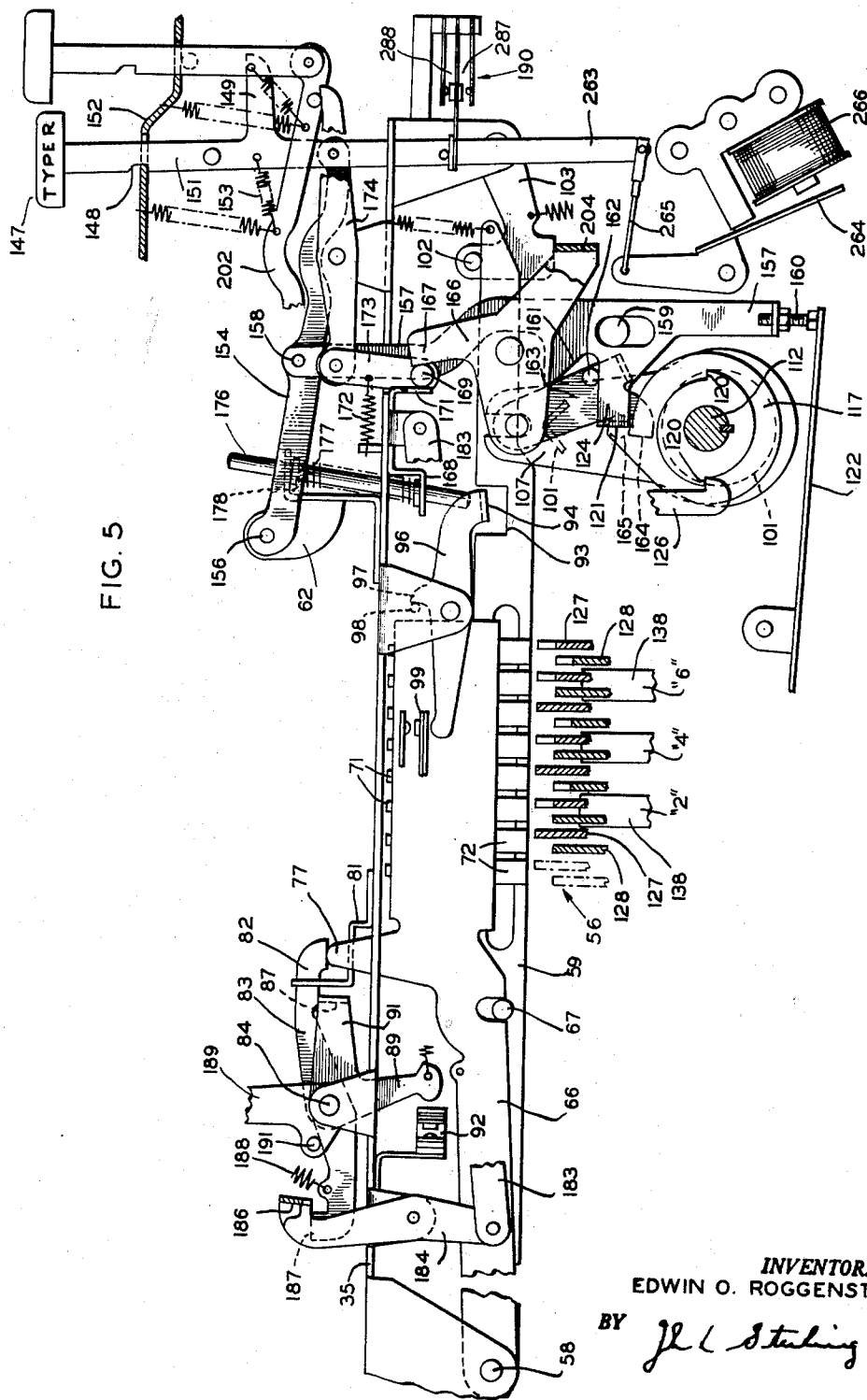
E. O. ROGGENSTEIN

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10 Sheets-Sheet 4



INVENTOR.
EDWIN O. ROGGENSTEIN

BY *J. L. Stelling*

ATTORNEY

May 31, 1960

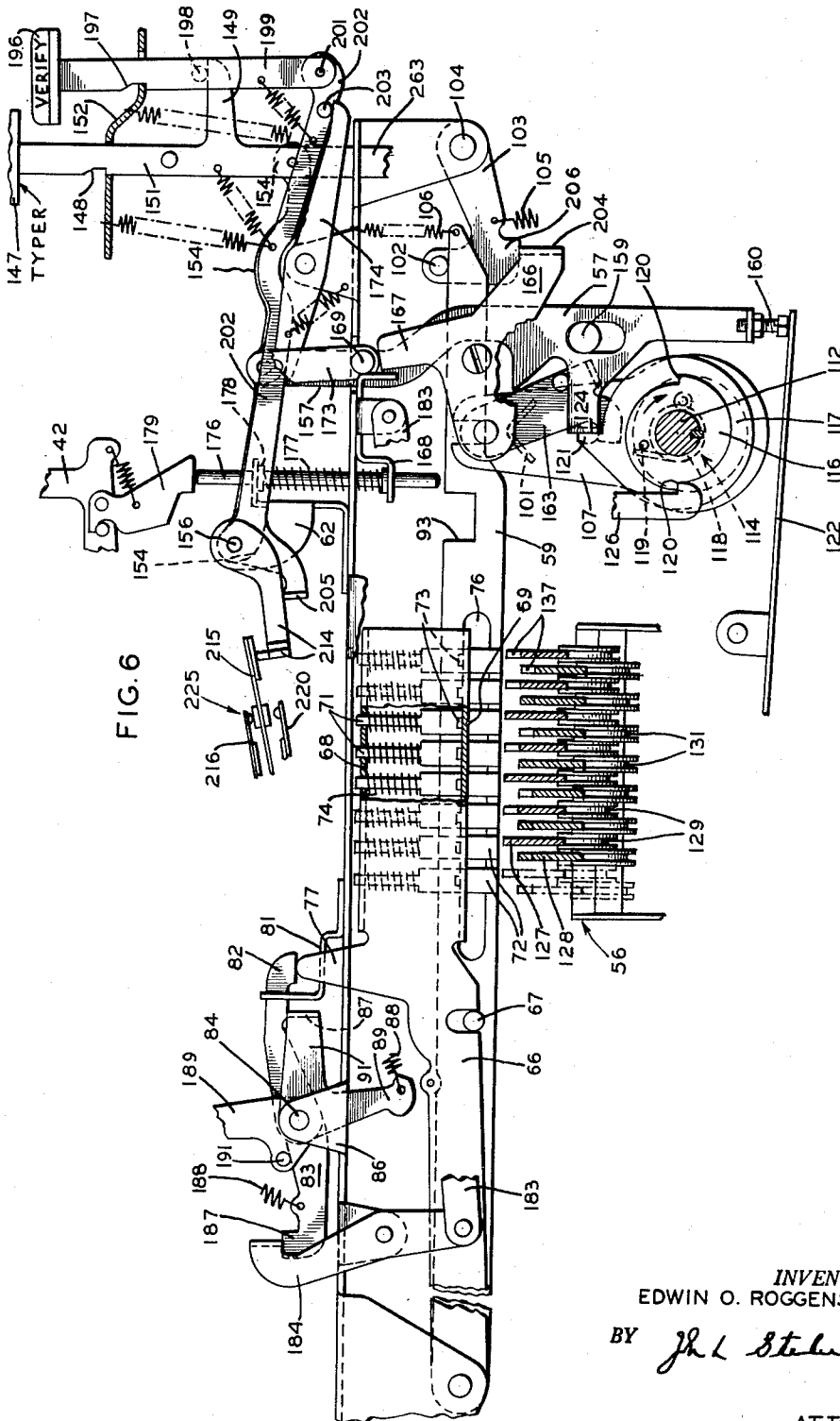
E. O. ROGGENSTEIN

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MEANS FOR TYPING, VERIFYING AND PRINTING

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10 Sheets-Sheet 5



INVENTOR.
EDWIN O. ROGGENSTEIN

BY *J. L. Stelling*

ATTORNEY

May 31, 1960

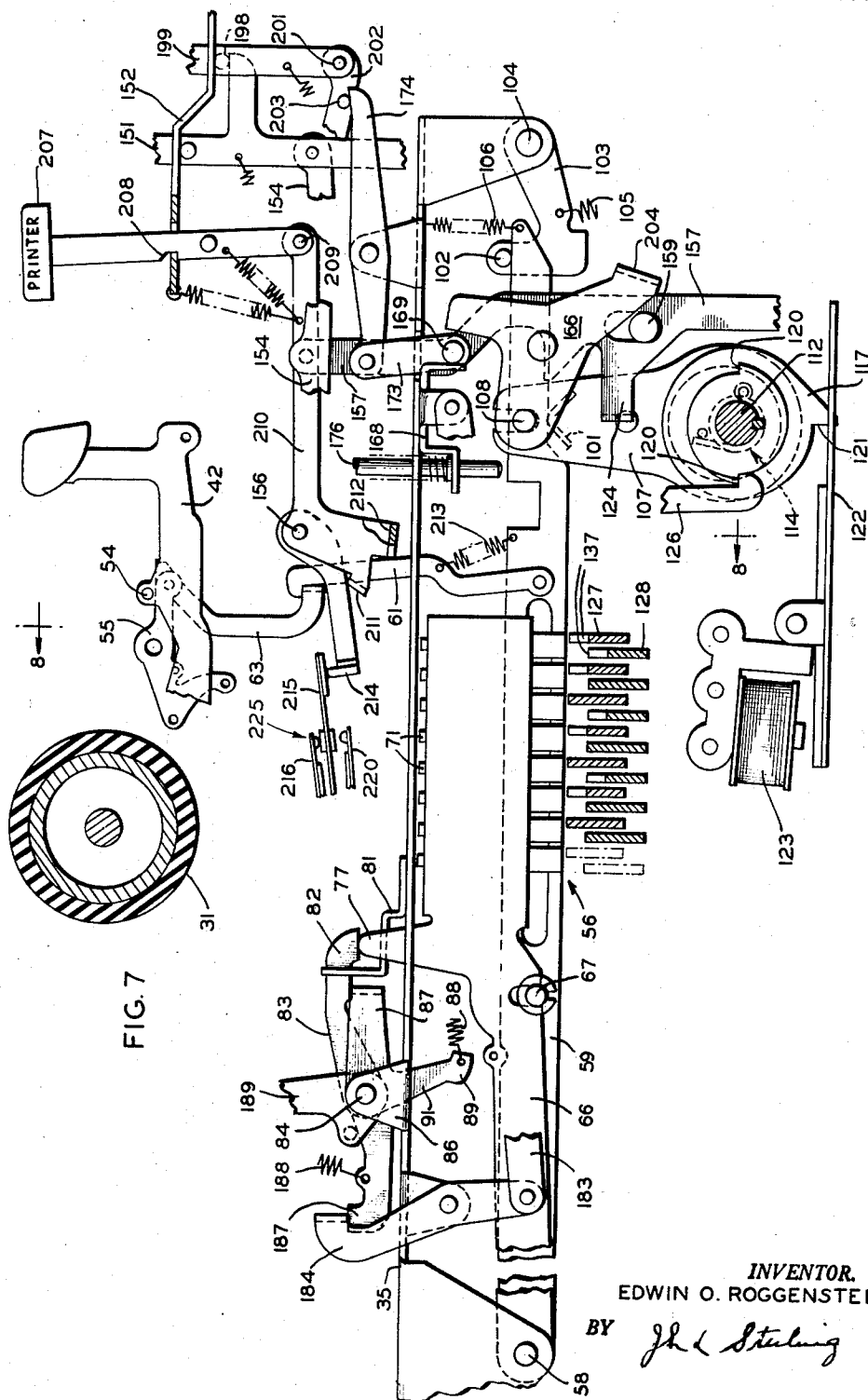
E. O. ROGGENSTEIN

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MEANS FOR TYPING, VERIFYING AND PRINTING

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10 Sheets-Sheet 6



INVENTOR,
EDWIN O. ROGGENSTEIN

BY *J. L. Stelling*

ATTORNEY

May 31, 1960

E. O. ROGGENSTEIN

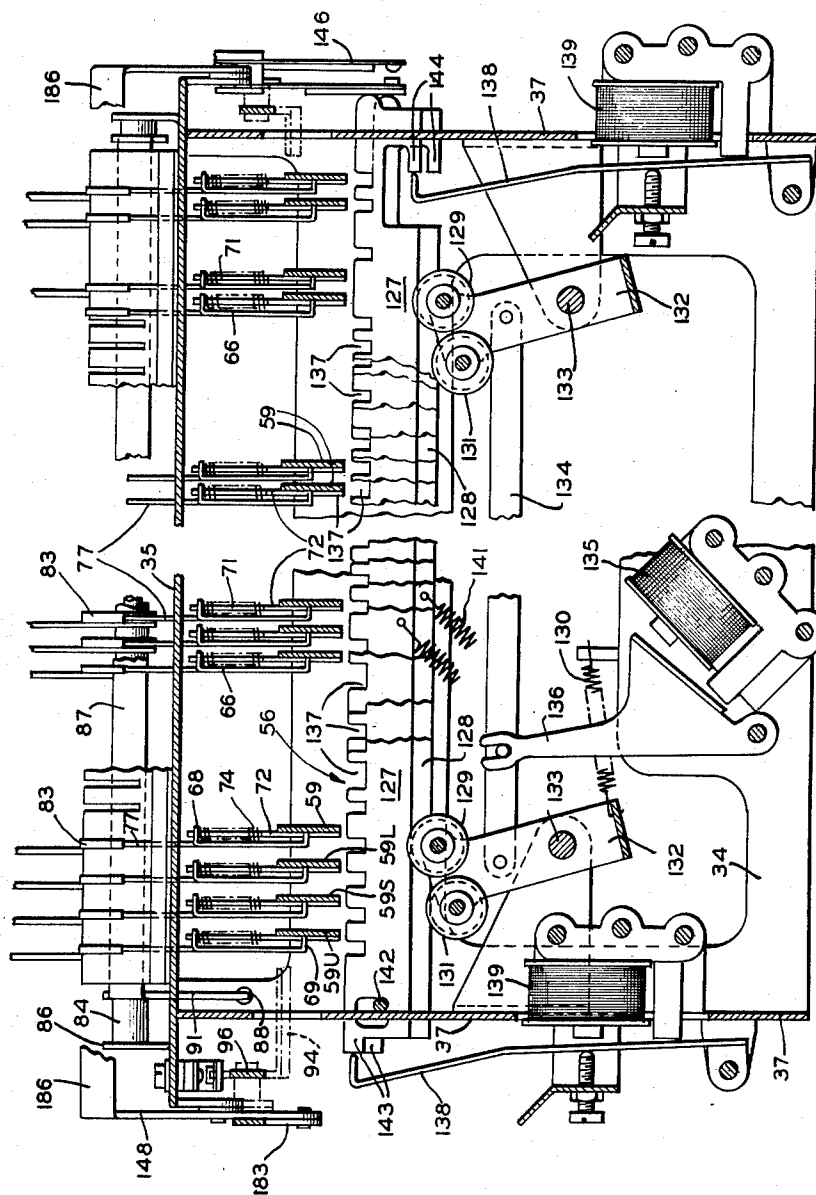
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MEANS FOR TYPING, VERIFYING AND PRINTING

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FIG. 8



INVENTOR.
EDWIN O. ROGGENSTEIN

BY *J. L. Stelling*

ATTORNEY

May 31, 1960

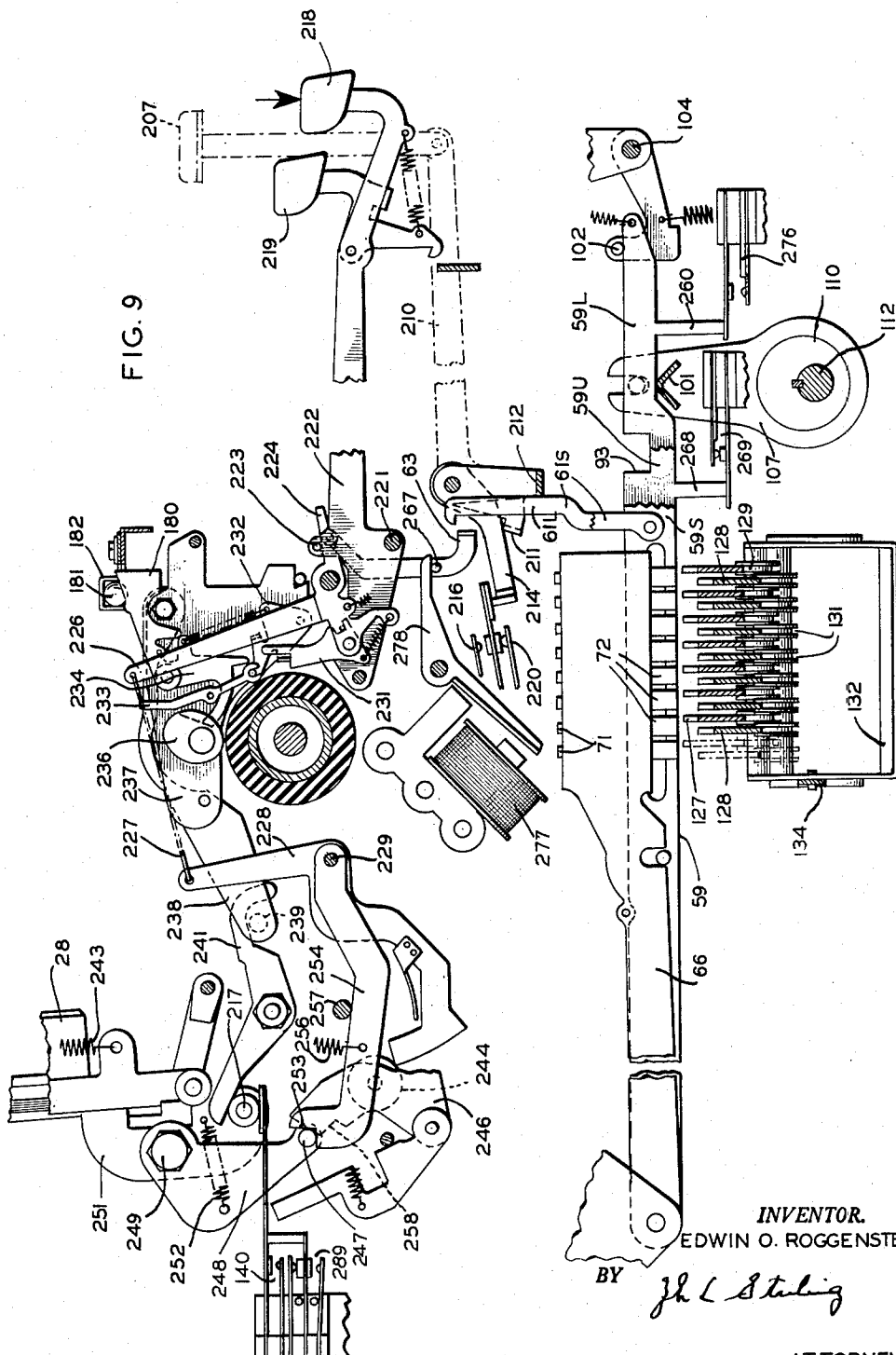
E. O. ROGGENSTEIN

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MEANS FOR TYPING, VERIFYING AND PRINTING

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May 31, 1960

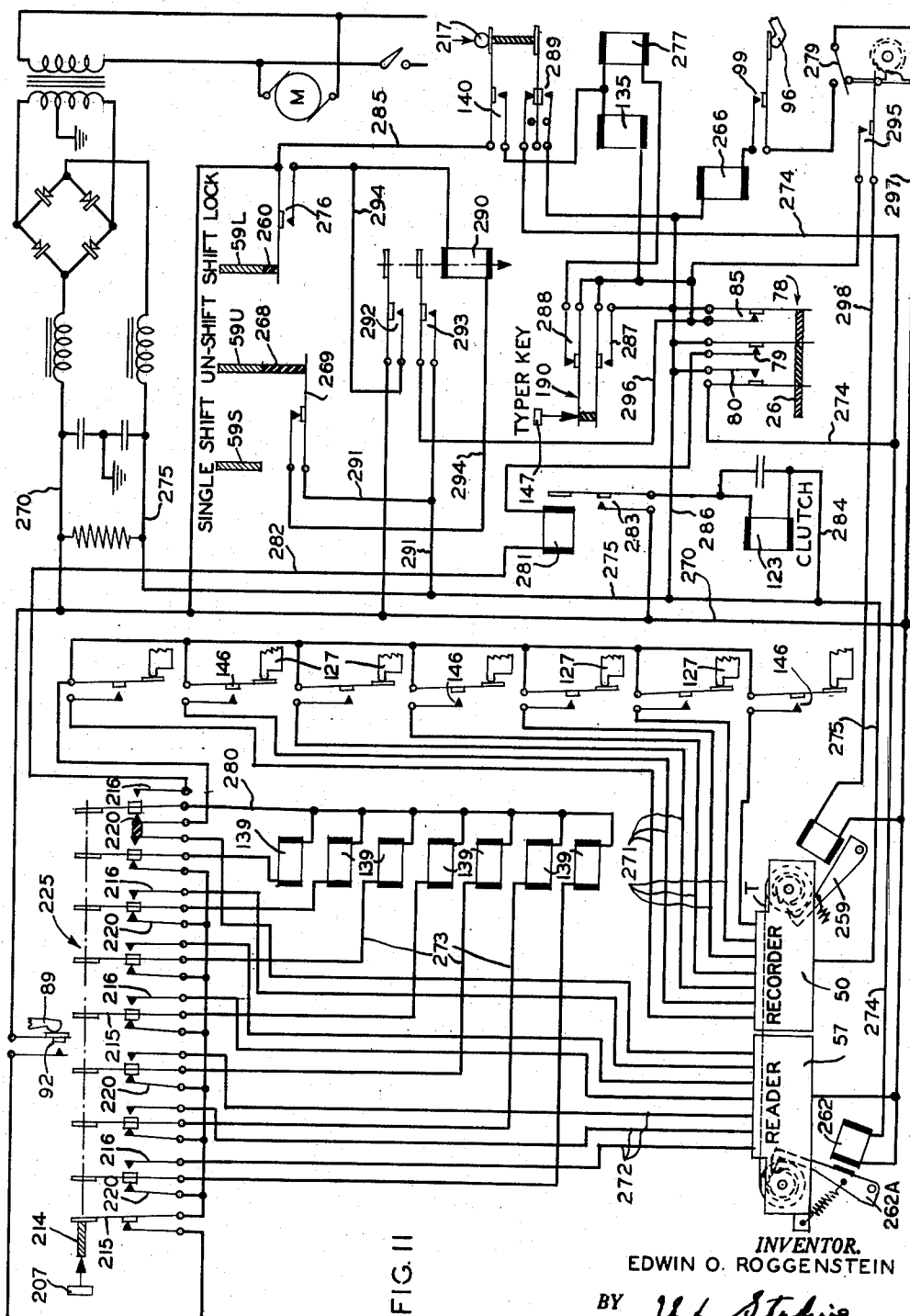
E. O. ROGGENSTEIN

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MEANS FOR TYPING, VERIFYING AND PRINTING

Filed Dec. 20, 1954

10 Sheets-Sheet 10



INVENTOR.
EDWIN O. ROGGENSTEIN

BY

Jh L Staking

ATTORNEY

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2,938,952

MEANS FOR TYPING, VERIFYING AND PRINTING

Edwin O. Roggenstein, Fairfield, Conn., assignor, by mesne assignments, to Sperry Rand Corporation, New York, N.Y., a corporation of Delaware

Filed Dec. 20, 1954, Ser. No. 476,299

24 Claims. (Cl. 178—17)

This invention relates to a typewriting machine and in particular to one adapted to be manually and automatically controlled.

In the use of electronic calculators that operate at high speed the information to be fed thereto is prepared and verified in advance. This data is usually in the form of code applied to a tape or a card by magnetic spotting as disclosed in copending application Serial No. 375,359, filed August 20, 1953. The output of the calculators is usually in code, and applied also to a tape in the manner above referred to, and an important object of the invention is to provide a machine in which an operator, copying original data, can make a typewritten record of the same, and at the same time cause the data to be encoded for application in code form to a tape magnetically.

A further object of the invention is to provide for adjustment of the machine so that when the data has been recorded on the tape, it may be subject to verification as the tape is read and the data decoded for controlling comparison typing, done manually by the operator, from the original data.

A still further object of the invention is to provide a machine of the character referred to in which a typewritten record can be made automatically of the data read from the tape through a tape reader or sensing mechanism of well known type and decoded by means herein disclosed to control the operation of the machine.

Other objects of the invention are the provision of a machine in which; the feed of a tape can be coordinated with the movements of a typewriter carriage so that matter entered on the tape can be read back for checking or correction; the code unit may be used both for encoding the typed material and for decoding the data read from the tape for controlling the operation of the machine; the mechanism of the machine can, by the use of simple adjustments of the parts from the keyboard, be operated to adapt the machine for use as a typer, a verifier or a printer; the code unit operating as an encoder or decoder can be adjusted to handle upper or lower case characters or symbols, as desired, by manual operation from the keyboard or automatically from the tape being read; a minimum number of parts are employed to produce a simplified construction which can be manufactured and maintained at a minimum cost and in which interlock means is provided to prevent operation of the machine unless set for a specific use and to prevent accidental actuation of the keys after a correction operation.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawing, forming a part of this specification, and in which like numerals are employed to designate like parts throughout the same,

Fig. 1 is a view in sectional elevation from front to back of the major portion of a machine constructed in accordance with the invention and showing the relative positions of the various parts of the structure;

Fig. 2 is an enlarged view in sectional elevation of

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the key controlled power mechanism and the combination encoding and decoding mechanism;

Fig. 3 is a plan view of the left end of the keyboard showing the location of keys for converting the machine for use as a printer, typer or verifier;

Fig. 4 is a plan view of the left end of the code slides shown in Fig. 2;

Fig. 5 is a front to rear view through the machine showing the relative position of the parts when the machine is conditioned for operation as a typer by adjustment of the typer key;

Fig. 6 is a view similar to Fig. 5 showing the parts adjusted to condition the machine for verifying operation when the verify key is latched down;

Fig. 7 is a view similar to Fig. 5 showing the parts set for operation as a printer when the corresponding key is adjusted;

Fig. 8 is a vertical section taken substantially on the line 8—8 of Fig. 7 showing the adjustable mounting of the code slides and the coacting selector bar and stop pin arm units;

Fig. 9 is a front to rear view through the machine showing the case shift mechanism in its relation to the code mechanism;

Fig. 10 is a view in perspective, showing the parts in exploded relation and illustrating the clutch and other control members that are adjusted by the printer, typer and verify keys; and

Fig. 11 is a wiring diagram showing the parts controlled thereby, schematically.

Referring to the drawing in detail, and in particular to Figs. 1 and 2, a power operated typewriter is illustrated which includes side frames 20 and 21 connected by a carriage runway 22 supporting a movable platen carriage 23; a paper feed roll assembly 24; and escapement assembly 25 operated by the universal bar 26, for controlling the feed of the carriage in letter space direction; a shift mechanism 27 for raising and lowering a type segment 28 for upper and lower case printing respectively; a motor 29 having a suitable driving connection with a power roll shaft 30 and a power roll 31 on said shaft; ribbon feed and vibrating mechanisms 32 and 33, respectively; an under frame 34, hinged to the frame of the typewriter, including top, front and side walls 35, 36 and 37, respectively, and suitable cross bars and rods for supporting the operating parts of the structure which are encased in a panelled housing 38. The keys of a keyboard 39 are operable to cause characters to be printed on a record or work sheet, held about a platen 41, and to control the operation of the typewriter.

Operation, manually or automatically, of any of the key levers 42 of the keyboard, will turn an eccentric cam roller 43 into engagement with the constantly operating power roll 31, through a key lever power mechanism 44, to raise a power arm 46 and a power arm extension 47 so that a roller 48 on the free end of the latter will cause a type bar bellcrank 49 to swing the type head 51, of a type bar 52, against the platen 41 through a pull link 53. One of the key lever controlled mechanisms 44 is provided for each key lever 42 which carries a pin 54 overlying the tail of a power trip bellcrank 55.

This machine may be used; as a "typer" to record data on a tape and at the same time make a typewritten record thereof through manual operation by a typist; as a "verifier" when the machine is adjusted to read data from a tape for comparison with the simultaneous typing of the same data by an operator; and as a "printer" when the machine is adjusted to read data from a tape and automatically make a typewritten record thereof without the services of a typist. The machine can be adjusted for the correction of errors and for reading back the data

on the tape upon failure of the verifier to check. In the use of magnetic tapes, upon which the encoded data is recorded and from which data to be decoded is read as disclosed in application Serial No. 375,359, the tape would be first prepared by the "typer," then verified and used, for example, in a high speed electronic computer. The output of the latter, entered on a tape, would then be typewritten automatically by the "printer." For convenience, the machine will be described first as a "typer," then as a "verifier" and finally as a "printer" after the structure of the combination encoding and decoding mechanism or unit 56 (Figs. 1, 2 and 5), used with each of these operating definitions, is explained.

The data typed on a paper carried by the platen 41 is encoded for magnetic recording on a tape and the data so recorded on the tape is read and decoded for printing and verification, the recording and reading in the case of a magnetic tape being done by a recording and reading head unit, of the magnetic type having seven or more code channels, as disclosed in Patent 2,618,709 granted November 18, 1952, to J. P. Eckert et al. In the use of the tape, separate recording and reading units 50 and 57 respectively are used. The code unit 56, Figs. 5, 6, 7 and 8 includes a shaft 58, extending parallel to and beneath the rear portion of the top wall 35, which shaft pivotally supports the rear ends of forwardly extending parallel selector bars 59. Each of the latter coincides with a key lever 42 bearing a character or a symbol and is adapted to be operatively connected to the power trip bellcrank 55, corresponding to said key lever, through a hook link 61 spring biased, in a guide bracket 62, Fig. 2 out of alignment with the uncinate end of a pendant 63 which is pivoted to a power trip bellcrank 55 and is spring held in a slotted guide plate 64. Each selector bar 59 has associated therewith an auxiliary stop pin carrier arm 66 also pivoted on shaft 58 and connected by a guide stud and washer device 67 to said bar for short swinging movement relatively thereto. The forward portion of the arm is channelled to provide upper and lower perforated guide flanges 68 and 69 respectively for supporting vertical flat stop pins 71 widened in their lower portions as at 72 and provided with ears 73 engaging the lower flange 69 to limit the downward movement of the pins under action of their compression springs 74. The upward movement of the arm 66 is limited by engagement of the lower flange 69 with the upper edge of a cut-out 76 in the associated selector bar 59. The combined thickness of the pins 72 and the associated bar 59 is such that both may fit into code serration of code slides as will be later explained. The upper edge of each pin arm 66, adjacent its channelled portion, is shaped to provide a vertical extension 77, passing through the top wall 35 and a guide bracket 81, for engagement by one end 82 of a rock lever 83 pivoted on a shaft 84 in a bracket 86. The shaft 84 supports a lift bail 87 underlying all of said levers 83 and urged against the under side of the latter by a spring 88 connected to the free end 89 of one of the bellcrank end arms 91 of the bail, which end arm is adapted to operate a switch 92, Fig. 2. The selector bars 59 are provided with aligned top edge rabbet openings 93 through which passes a pin bail 94 having lever arms 96 pivotally supported from the top plate 35 and tensioned by a spring to keep a nose 97, on one of the arms, against a limit pin 98 and the free end of said arm spaced from a key restoring switch 99. Each selector bar 59, at its forward end, passes over a gable shaped lift bar 101, through a guide slot in the front wall 36 and beneath a stud 102 that projects from the free end of a tension arm 103 pivoted on a cross shaft 104, which arm is urged downwardly with greater force by a spring 105 than the extremity of the bar 59 is urged upwardly by its spring 106. The free end of each bar 59 is thus spring supported to resist any accidental movement with the movement of its associated pin carrier 66 when the latter is pushed down by a rock lever 83.

The lift bar 101 is mounted at its ends in spaced lift arms 107 slotted at their upper ends to be guided over studs 108 carried in brackets 109, Fig. 2, mounted on the inside of the front wall 36. The arms 107 are each supported on an eccentric disk 110 Fig. 10, keyed to a clutch shaft 111 axially aligned with a stud shaft 112 driven through a suitable pulley and belt connection 113 from the power roll shaft 30. The shafts 111 and 112 are connected by a one-revolution clutch 114 consisting of a reverse detent disk 116 and a stop disk 117. A spring 118, Fig. 6 coiled about the abutting ends of the shafts 111 and 112 has one end secured in the reverse detent disk 116 and the other end extended for engagement by a pin 119 carried on the stop disk 117. Disk 116 is provided with diametrically opposite teeth 120, and disk 117 is provided with a single tooth 121 for engagement by either a detent armature 122 controlled by a magnet 123 or a stop arm 124. Either of the teeth 120 of the disk 116 is engaged by a spring urged pawl 126. Upon energization of the magnet as will be later described, the armature will release the stop disk and the spring will grip the abutting ends of the shafts 112 and 111 to drive the latter. When the disk 17 is engaged by either the armature or the stop arm 124, the spring will be expanded by its turning pressure against the pin 119 and the shaft 111 will stop rotating.

The forwardly extending selector bars 59 are disposed at right angles to two sets of laterally extending parallel code slides which are mounted for endwise sliding movement in suitable slots in the side walls 37 of the frame 34. The slides are arranged in two sets, one corresponding to lower case as at 127 and the other to upper case as at 128. The slides of group 127 are mounted on rollers 129 and, as shown in Fig. 8, are supported in a raised operating position while the slides of group 128 are supported on rollers 131 in a lower non-operating position. The rollers are carried in case shift arms 132 pivoted as at 133 in frame brackets and connected by a shift bar 134 for rocking movement under influence of a case shift bellcrank 136, which constitutes an armature operated by a magnet 135, to selectively place either group of code slides in position for use. The arms 132 are urged counterclockwise by a spring 130 to yieldably hold the slides 127 in uppermost position. The code slides 127, 128 are differentially serrated along their upper edges to provide code slots 137 some of which are laterally aligned when the slides are unmoved and others of which are aligned when the slides are moved endwise by the movement of pivoted slide armatures 138 when actuating magnets 139 are energized. The armatures of the magnets 139, Figs. 2 and 5, are designated as "1," "2," "3," "4," "5," "6" and "7" to correspond with a slide of each group. Eight slides are indicated to show that any number may be employed, but, for the purpose of illustration only seven slides are used which, through springs 141, are biased toward the left side of the machine against a front to rear stop rod 142 secured to the side wall 37 and passing through aligned openings in said slides. The latter, at their left and right ends, are shaped to provide upper tabs 143 and lower undercut tabs 144 respectively for engagement by the upper offset ends of the armatures "1," "3," "5," "7" and "2," "4," "6" respectively. As shown in Fig. 4, a selector bar 59 corresponding to letter "A" will move down into the aligned notches of all seven of the code slides when the slides "1," "3" and "5" are moved rightward, by their armatures, to limit against the stop rod 142. When any of the slides are moved to the right a switch 146, corresponding to each slide, will be closed for controlling a record circuit as will be later explained.

Typer

When the machine is to be conditioned for manual operation to print data on a sheet of paper on the platen 41, to encode the data being typed and to record said encoded information on a tape through the use of the

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head unit 50 operating as a recorder, a typer key 147, Fig. 5, at the left side of the keyboard, having a notch 148 and an offset 149 in its stem 151 which extends through a guide latch plate 152, is pushed down and latched by the action of its spring 153. The downward movement of key 147 swings a link 154 about a pivot pin 156, which latter is supported in the bracket 62, so that a vertical actuator 157, pivoted to the link as at 158 and guided by a pin 159, moves downwardly and disengages the detent armature 122 from the clutch stop disk 117. At the same time, the stop arm 124 moves down into the path of the tooth 121 that was released by the detent 122 and the clutch is disconnected after a half revolution of the eccentric 110 has lowered the lift bar 101 to the position shown in Figure 5. The lower end of the actuator 157 carries an adjusting screw means 160 for close control of the release action of the detent armature 122. In addition to the stop arm 124 the actuator 157 is shaped to provide a cam edge 161 which, through a pin 162 on a latch link 163 pushes the hooked lower end 164 of the latch link beneath a stud 165 projecting from the lift arm 107 so that, upon a lowering movement of the latter, the link 163 will rock a trifurcate crank 166 to cause a free end 167 thereof to move a detent bail slide 168, through an interponent. The latter, in the nature of a pin 169 is held against the lip 171, of the slide 168, by a spring 172 which pulls on a link 173 in the lower end of which the interponent pin 169 is carried. The link 173 is pivoted to one end of a lever 174 to be later referred to. When the interponent 169 is not raised out of range of the crank end 167, the slide 168 will swing the lower ends of a row of transfer pins 176 from over the upper edges of the selector bars 59 and into register with the pin bail 94 to operate the switch 99 for a purpose to be later described. One pin 176 is provided for each of the typewriter key levers 42 and is yieldably maintained in raised position by a spring 177 which rests on the slide 168 and pushes a flanged portion 178 of the pin against the underside of the bracket 62. The upper end of each pin 176 lies beneath the nose of a dog 179 depending from each key lever 42. A suitable ball lock arm 180, Fig. 2, forming part of the power lever mechanism 44, is adapted to fit between the balls 181 of a key lever lock 182 which prevents operation of more than one key lever at a time. The slide 168, through a link 183, may rock a lever 184 to move a detent bail 186 from over the shouldered ends 187 of all of the rock levers 83. The latter are each connected by a spring 188 with a break link 189 having a pin 191 held in contact with the upper edge of an associated rock lever 83. The links 189 are pivoted on the shaft 84 and have pin and slot connections 192 with bellcranks 193 which in turn have pin and slot connections 194 with the type bar bellcranks 49.

Reference to Figs. 4 and 8 will show that the combined thickness of each selector bar 59 and an associated stop pin 71 is slightly less than the width of any code slot 137 so that any selector bar and its pins can fit into the code slots when the combination is lowered as will now be explained. After the typer key 147 has been latched down the operator proceeds with the typing to make a visible record of the data on paper carried by the platen and simultaneously enter it on the tape after it is encoded. This is done, as exemplified by operation of the "a" key, by pressure on the latter "a" key to cause the eccentric cam roller 43 to engage and be operated by the constantly rotating power roll 31 to lift the power arm extension 47 and throw the type bar on a printing stroke through operation of the type bar bellcrank 49 and pull link 53. Upon operation of the bellcrank 49 the break link 189 is swung clockwise by the action of the bellcrank 193 and the tension of spring 188 will cause the end 82 of rock lever 83 to push down on the extension 77 of the stop pin arm 66 against the resistance of the bail 87. As the stop pin arm 66 lowers, the pins 72 thereof will enter the code notches in the lower case slides "2," "4," "6" and "7"

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before the free end 89 of the bail arm 91 closes the switch 92. Closing of the latter will energize all of the magnets, 139, Fig. 8, to cause the armatures 138 to push against the slides 127 with the result that the ones not held by the pins, as "1," "3" and "5," will be moved endwise to close their respective switches 146 and energize a record circuit including the channel coils of a magnetic recording head 50 so that a coded representation of the letter "a" will be entered on the tape. Inasmuch as all of the functional keys of the machine have operation symbols, the general circuit of the device includes magnets for the operation of the various controls such as case shift, space, backspace, tabulate, carriage return, etc. Upon operation of the space and character key levers 42, a compound switch 78, Fig. 1, operated by the universal bar 26, opens a circuit to the magnets 139 through an arm 79, and through another arm 80 closes a circuit to move the tape in character space movement, as will be later explained.

Verifier

In the operation of the machine as a verifier, the head unit or reader 57 reads the tape code symbols as the tape is advanced in synchronism with the typewriter carriage in the manner disclosed in application Serial No. 375,359 above referred to. A circuit including the reading head unit 57 and the magnets 139, corresponding to the code slides "1," "3" and "5," is energized as the unit reads the code character corresponding, for instance, to the letter "a." The magnets operate the slides to align the notches of the slides "1," "3" and "5" with the notches in the other slides so that, if the typist, who is copying the data of the tape from an original copy, strikes the "a" key, this letter will be printed by the type head 51. To condition the machine for operation as a "Verifier" a special key 196, Fig. 6, having a notch 197 for latching engagement with the plate 152 and having a pin 198, is depressed and lowers with it the "Typer" key 147, through the action of the pin 198 on key 197 bearing on the offset 149 of the stem 151 of key 147. The latter is not latched in the plate 152 but rocks the link 154 to lower the actuator 157 to cause the release of the clutch stop disk 117 by the detent armature 122 through the adjusting screw 160 and at the same time to lower the stop arm 124 to catch the released tooth 121 permitting a one-half revolution of the clutch which lowers the lift bar 101 as shown in Fig. 6. The key 196 has the lower end of its shank 199 pivoted as at 201 to the outer end of a forwardly extending pin arm 202, whose pin 203 overlies the free end of the interponent lever 174 to rock the latter about its pivot when the arm 202 is pushed down about its pivot 156. This action, through link 173, lifts the interponent pin 169 out of range of the free end 167 of the crank 166 so that the slide 168 is not moved when the crank is operated by the downward movement of the actuator 157. The pins 176 are consequently held in alignment with the upper edges of the selector bars 59 and when the letter "a" key lever is depressed, the associated pin 176 will push the corresponding selector bar 59 down, if the code slides 127 have been set in accordance with the letter "a" as read from the tape by the unit 57. The end of arm 202 has an offset portion 205 which underlies one arm of a switch bail 214 to be later referred to, so that when the "verify" key is latched down as shown in Fig. 6, the reader circuits to the magnets 139 are completed for the characters sensed by the head 57. It is evident that if the typing, done manually by the operator, does not match the settings of the code slides for each character read, the selector bar cannot be depressed and the operator will be aware that an error is involved. The selector bars 59 are normally urged downwardly by the springs 105 and pulled upwardly by the lighter springs 106. When the lift bar 101 is lowered by the action of the clutch, the pivotal movement of the crank 166 will bring a bail 204 of the latter up under the heel portions 206 of the tension arms 103 to counter-

act the downward force of the springs 105 so that the selector bars can be pushed down, against the resistance of the springs 106, by the manual operation of the pins 176. When the bars 59 operate, the hook links do not engage the pendants 63 because the "printer" key has not been latched down.

Printer

When the machine is to be used to print the data read directly from the tape, automatically, a printer key 207 is latched down by engagement of its notch 208 with the latch plate 152. The lower end of the key 207 is pivoted as at 209 to the forward end of a bail arm 210 pivoted as at 156 and shaped to provide an offset 211 and a bail 212 common to all of the hook links 61 which are held against the edge of the bail by springs 213. Operation of the keys 207 holds the upper hooked ends of the links 61 over the aduncous ends of the pendants 63 so that, as any selector bar 59 is pulled down, by the action of the associated spring 105 to fit into the properly aligned notches of the code slides 127 or 128, the corresponding key lever power mechanism 44 is conditioned for operation by the pull of the pendant 63 on the power trip bellcrank 55. The offset 211 swings the other arm of the switch bail 214, pivoted on 156, for operating switches 215, Figs. 7 and 11. When the key 207 is latched down the selected reader circuits through magnets 139 are completed by engagement of switches 215 with the switch contacts 216. When the key 207 is unlatched, the switch contacts 220 complete the circuits through all of the magnets 139.

When the head unit 57 operates as a reader for the tape the coded data of the channels of the latter will be suitably amplified and transmitted as current to energize the magnets 139 to pull on the armatures 138 and move the slides "1," "3" and "5" corresponding to the code of the letter "a." The magnet 123 of the one revolution clutch 114 is also energized and operation of the clutch pulls the lift arms 107 and the lift bar 101 down to allow the tension arms 103 to press down on the forward ends of the selector bars 59 which action occurs each time after the code slides have been adjusted by the action of their armature controlling magnets 139. Operation of the type bar bellcranks 49 will not cause operation of the rock levers 83, Fig. 2, because the actuator 157 is not moved and the latch link 163 is not adjusted thereby to swing the crank 166. The slide 168 and link 183, therefore, maintains the bail 186 in detentive position with respect to said rock levers 83, with the break links 189 being free to operate independently of the latter. As each letter or symbol is read from the tape, the code slides are set and permit one selector bar to be pulled down into the laterally aligned code notches thereof so that the hook link 61 of said bar will cause operation of the corresponding type bar through the associated key lever power mechanism 44. As the type bar 52 actuates the usual universal bar 26 a switch, Fig. 1, is operated to break the circuit through contact 79.

If during the verifying operation, the typist is unable to depress a key it is evident that a wrong key has been struck or that an incorrect character has been sensed in the tape. In the latter case the operator may "read" the character in the tape by releasing the verifier key 196 and depressing the printer key 207 so that the magnet 123 operates the clutch 114 and the lift bar 101 allows all of the selector bars 59 to drop down so that the one bar 59, that will fit into the notches of the code slides, will operate the corresponding type bar 52 through the hook link 61, pendant 63 and the associated key lever power mechanism 44. This use of the "printer" operation may be referred to as the visual reading or data indicating means. Operation of a backspace key 40 (Fig. 3) as explained in the application S.N. 375,359 will erase the incorrect character on the tape to permit the correct one to be entered when the operator converts

the machine to a "typer" by operating key 147 after the key 207 has been released.

During verification the key 196 is latched down and when an error is found, the verify key is unlatched and the typer key 147 is then latched down. This operates the clutch 114 one-half a revolution to lower the lift bar 101 and operate detent slide 168 so that the transfer pins 176 overlies the bail 94 and the detent bail 186 is moved to release position with respect to the rock levers 83. In the use of the magnetic recording head 50, when the typewriter carriage 23 is backspaced by operation of the backspace key 40, current of reverse polarity applied to the head 50 as fully explained in application S.N. 375,359 erases the incorrect character as the tape is backspaced one letter space through operation of magnet pawl means 259 in a circuit controlled from the spacing dog means 261. Operation of the proper key will then cause the correct character to be recorded on the tape T as the latter is fed forward one letter space by the tape feed pawl operated magnet means 262 a circuit including which magnet is controlled through the contact arm 80 of switch 78 actuated by the universal bar 26. The tape can be brought to starting position by operation of the space bar, after which the reader 57 will take over. In order that the machine will not be inadvertently used as a typer after the correction has been made, an extended portion 263 of the key stem 151, Fig. 5, is swung clockwise, about its pivot on 154, by the armature 264 operating through a pull link 265 when a magnet 266 is energized to unlatch the typer key 147. The latter occurs when the switch 99 is closed in operation of the bail 94 by a pin 176, but after movement of the code slides has been completed in order that the setting of the mechanism controlled by the latched-down typer key will not be disturbed. The verify key is again latched down for continuation of the verifying operation.

In the event that characters of a single case are to be used no provision need be made for shiftably mounting the code slide sets 127, 128 as one set would suffice. In the present instance where upper and lower case sets are used, they are shifted by operation of the case shift bellcrank 136 under influence of the case shift magnet 135. The latter is energized when a switch 140, Fig. 9, is closed by the downward movement of a stud 217 with the type bar segment 28 to cause the printing to occur in upper case or by the upper portions of the type heads 51 on which the upper case characters and symbols are formed.

For case shift by the operator, the usual shift keys 218, Fig. 9, with their shift locks 219 are located at opposite sides of the keyboard and are connected by a fulcrum rod 221. The extension 222 of the shift key at the left side of the keyboard, carries a stud 223 for rocking a bellcrank 224 whose arm 226 is connected by a pull wire 227 with the upper end of a shift bellcrank 228 pivoted as at 229. The operation of the power mechanism 44 through the bellcrank 224, lift pawl 231, power trip lever 232, roller trip arm 233, roller detent 234, cam roller 236, power arm 237, power arm extension 238 and a pin 239 on the latter causes a power shift lever 241, bearing on the stud 217, to pull the type bar segment 28 down against the resistance of its spring 243. Before the shift lever 241 is operated the bellcrank 228 at its free end pushes against a roller 244 carried on a pivoted shift latch 246 to swing the latter counterclockwise against a pin 247 carried on the lower free end of a shift catch plate 248 pivoted as at 249 to a bracket 251 fixed to the type bar segment 28. The pin 247 is maintained by a spring 252 in the shoulder 253 of a detent arm 254, which is urged by a spring 256 to raised position against a stud 257. The pin is pushed from the shoulder by the counterclockwise movement of the latch 246 so that the shift lever 241, in low-

ering the segment, need operate only against the resistance of the spring 243. When the pin has been displaced it is latched down by a notch 258 in said latch 246, as the latter continues its movement when the segment is pushed down by the action of the shift lever 241, to provide for printing in upper case. When the machine is being used as a "typer," the operator, in copying from the original matter, will be able to print any one of three symbols that are used in case shift operations to designate "single shift," "shift lock" and "unshift." These symbols in code form, will be entered on the tape so that, when the machine is used as a "printer," the particular symbol sensed will control the case shift operation of the machine automatically.

For the purpose of explaining the control of the mechanism, reference is made to the wiring diagram of Fig. 11. With the "typer" key 147 (Fig. 5) latched down to close its switch 190 and with the manual switch 279, which is adjacent the backspace key 40 on the keyboard (Fig. 3), in open circuit position, operation of any character key will close switch 92 to complete circuits from the line 270 to all of the magnets 139 through the closed contacts 220 of switch 225 and leads 273. The switches 146, that are closed by movement of the slides 127, complete selected circuits 271, 275 to operate the recorder 50. The tape is fed by operation of a spring based pawl 262A controlled by the magnet 262 included in the circuit 270, 274, 275 closed by switch contact 80 upon each operation of the universal bar 26. The operator conditions the machine for single case shift, unshift, and case shift lock, manually in the usual manner and causes a symbol to be entered on the tape for each condition. When the type segment is lowered, by the operator holding the shift key down for printing an upper case character, the stud 217 of the segment closes switch 140 and through lead 285; closed switch 287, 286 and 275 actuates the code bar shift magnet 135. When the character is printed by the typewriter the operation of the universal bar 26 closes contact 80 to complete a circuit through the line spacing means 262 via the line 270 and returns 274, 286 and 275. When the operator releases the "shift" key, the stud 217 causes the circuit of magnet 135 to be broken with the result that the code bars are shifted back to lower case by the spring 130. In the typing operation the operator controls the "shift," "shift lock" and "unshift" functions of the machine manually from the keyboard as well understood.

When the machine is to "print," as automatically controlled from the reader 57, the "Printer" key 207 (Fig. 7) is latched down and through bar 214 opens switch contact 220 and closes contacts 216 so that the circuit leads 272, 273 from line 270 through the reader 57 energize the magnets 139, corresponding to the character sensed, to move the code bars 127. A circuit through line 280 and the rightmost closed contact 216 activates a relay 281 through line 282, closed switch 79 and return 286, 275 to close a switch 283 for operating clutch magnet 123 in the circuit 270, 284, and 275. Operation of the clutch detent armature 122 will release the selector bars 59 so that the key levers can be operated by the hook links 61. Operation of the universal bar 26 will break the relay circuit by opening contact 79 of switch 78 and will cause the tape feeding magnet means 262 to operate by closing the contact 80 of switch 73 to complete a circuit 270, 274, 286 and 275. Switch 92 will not be closed as the type keys are operated, because the detent slide link 183 has not been shifted by crank 166, and the bellcrank 87 is disabled. For automatic case shift operations of the machine, under control of the symbols on the tape, the code slides are adjusted by the corresponding magnets 139, so that a "single shift" selector bar 59S can be operated to condition the machine for "single shift" and "shift lock" through the hook links 61S and 61L, respectively. Operation of the single shift bar 59S will cause the stud 75

217 to a closed shift circuits through the segment shift magnet 277 and the code bar shift magnet 135 by way of 270, 285, 140, and the switch 288 in the case of magnet 277 contact 85 of switch 78, 286 and 275. As the switch 140 is closed another switch 289 defined as a make before break switch closes a circuit 270, 274, 286, 275 to energize the tape feed means 262 so that the next character can be sensed by the reader. When the character so sensed is printed, the universal 26 breaks the shift circuit and the machine resumes operation. When a shift lock signal is read the selector bar 59L following operation of clutch 114 pulls down on the hook 61L to cause case shift and at the same time closes a switch 276 to activate a relay magnet 290 in line 291 completed by a normally closed switch 269. The magnet 290 will close relay contacts 292 and 293, the first of which will provide a shunt circuit 294 from line 270 through magnet 290, switch 269 and return 291, 275 so that magnet 290 will be held active after the switch 276 opens. The contact 293 completes a circuit from lead 285 through switch 140, magnets 135, 277, switch 288 in the case of 277, line 296, contact 293, return 291 and 275 to hold the segment down and the upper case set of code bars raised for extended upper case printing. When an "unshift" signal is detected, the bar 59V lowers and opening switch 269 restores the machine to condition for lower case printing when the tape feeding means 262 is activated by the operation of a make before break switch 289 when the stud 217 raises. The switch 289 is in the circuit 270, 274, 286 and 275.

When the machine is conditioned for "verify operation," the verify key 196 is latched down and the typer key 147 is held depressed. The contacts 216 are closed and the switch 92 remains open, circuits 270, 272, 280 operate as a reader but the selector bars 59 are pushed down by the pins 176 which do not operate to close the switch 99. The clutch 114 has been conditioned for operation mechanically by the depressed typer key so that the selector bars can be pushed down by the pins. The code slides 127 are adjusted by the magnets 139 so that the selector bars 59, that corresponds with the character sensed, can be pushed down. The rightmost switch 220, being open, prevents operation of the recorder 50 when the switches 146 are closed by operation of the slides 127. If an error is detected in the tape during the verifying operation, the machine is conditioned for typing by latching down the "Typer" key 147. The tape is back-spaced for erasure by operation of the backspace key 40 which closes a manually operable switch 279 and a switch 295 to complete a circuit from 270 through the magnet of back-space pawl 259 through line 298, closed contact 85, and lines 286 and 275. When the correct character is typed, a circuit is completed from 270 through line 297 switch 279, closed contact 99 and lines 286, 275 to energize magnet 266 which releases the typer key from latched down position so that the operator cannot continue typing. The machine is again conditioned for verifying by setting the verify key 196. In normal typing operation the switch 279 is set to open position manually.

While there has been shown and described what is considered to be a desirable and novel embodiment of the invention, it is obvious that changes in form could be made without departing from the spirit of the invention and it is not the wish to be limited to the precise form herein shown and described, nor to anything less than the whole of the invention as hereinbefore set forth and hereinafter claimed.

What I claim as new, and desire to secure by Letters Patent, is:

1. In a typewriter for recording on a tape code designations of data being typed on a sheet; serrated code slides; selector bars extending laterally on said slides; stop-pin carriers on said selector bars having stop pins coacting with said slides; key controlled means for op-

erating type bars of the typewriter and for actuating corresponding carriers to position the pins of the latter in serrations of some of said slides to render the latter immobile; key controlled means for moving the selector bars into the slide serrations; slide moving means including magnet means, a circuit for the latter, and a switch for controlling said circuit, actuated by said operating means; a circuit including recording means and switches operated by the movable slides for controlling the operation of said recording means through said circuit to record the code designations represented by the movable slides and key set means for disabling the selector bar moving means and enabling said carrier actuating means.

2. In a typewriter for comparing data being typewritten on a sheet, with coded recordings of said data on a tape; serrated code slides; a circuit including a tape character reader and means for adjusting said slides to align the serrations thereof in accordance with the character read from the tape; character selector bars one only of which fits into the aligned slide serrations; key means for operating a selected type bar to print a character; and key movement transfer means normally blocked against operation by said selector bars and operable to move a selector bar into aligned serrations of the slides when the selected type bar key means corresponds to the character read.

3. In a typewriter for printing, recording and comparing data for use in a tape including control means for selectively conditioning the typewriter for one of said operations; serrated code slides; character selector bars biased to lower into aligned serrations of said code slides; bar support means movable to nonsupport position; means for controlling operation of said movable means; a circuit including a character reader, said control means, and means for adjusting said slides to align serrations thereof in accordance with a character read; and type bar actuating means associated with each selector bar for printing the character corresponding to the selector bar lowered into said aligned serrations when said support means moves to non-support position.

4. In a typewriter for printing, recording and comparing data for use in a tape including control means for selectively conditioning the typewriter for one of said operations; sets of serrated code slides arranged in upper and lower case groups; key controlled means for selectively positioning said groups for use; stop-pin carriers coacting with the selected group of slides; key controlled means for operating type bars of the typewriter and for actuating corresponding carriers to position stop-pins of the latter in serrations of some of the slides of the selected group to render the slides immobile; slide moving means including magnet means, a slide circuit for the latter and a switch for controlling the circuit operated by the carrier actuating means; and a recording circuit including recording means and switches operated by the movable slides for controlling the operation of said recording means through said second circuit to record the code designation represented by the movable slides.

5. In a typewriter for printing, recording and comparing data for use in a tape including control means for selectively conditioning the typewriter for one of said operations; sets of serrated code slides arranged in upper and lower case groups; key controlled means for selectively positioning either group for use; stop-pin carriers coacting with the selected group of slides; key controlled means for operating type bars of the typewriter and for actuating corresponding carriers to position stop-pins of the latter in serrations of some of the slides of the selected group to render said slides immobile; slide moving means including magnet means; a first circuit for the latter and a switch operated by the carrier actuating means for controlling said circuit; and a second circuit including recording means and switches operated by the movable slides for controlling the operation of said re-

cording means through said second circuit to record the code designation represented by the movable slides.

6. In a typewriter for printing, recording and comparing data for use in a tape including control means for selectively conditioning the typewriter for one of said operations; sets of serrated code slides arranged in upper and lower case groups; means for selectively positioning either group for use; character selector bars biased to lower into aligned serrations of the selected group of slides; bar support means movable to non-support position; means for controlling the operation of said movable means; a circuit including a character reader, said control means, and means for adjusting the selected group of slides to align serrations thereof in accordance with a character read; and type bar actuating means associated with each selector bar for printing the character corresponding to the selector bar lowered into said aligned serrations when said support means moves to non-support position.

7. In a machine of the character described; combination encoding and decoding means including character selector bars; means including key levers for operating said machine; key settable means for adjusting said code means for typing, verifying and printing operations including means for blocking operation of said selector bars; typer, verifier and printer keys each selectively settable to condition said adjusting means for the respective operations; and means coacting with said selector bars and said key levers for blocking operation of the machine in the absence of a setting of any of said conditioning keys.

8. In a typewriter for printing, recording and comparing data for use in a tape including control means for selectively conditioning the typewriter for one of said operations; a combination encoding and decoding mechanism including parallel code slides each having serrations along an edge thereof; selector means extending across said slides including pins for engaging the slides and biased to engage certain aligned serrations thereof to detain the respective slides against movement; key controlled means for depressing one of said selector means; circuit means controlled by operation of said selector depressing means for moving the slides unrestrained by said pins; and switches actuated by said last mentioned slides for controlling a record circuit.

9. In a typewriter for printing, recording and comparing data for use in a tape including control means for selectively conditioning the typewriter for one of said operations; a combination encoding and decoding mechanism including sets of parallel code slides arranged in upper and lower case groups and each having serrations along the upper edge thereof; means for selectively positioning either of said groups for use; selector means extending across said slides including pins for engaging the slides of a selected group and biased to engage certain aligned serrations of the selected group to detain the respective slides against movement; key controlled means for depressing one of said selector means; circuit means controlled by operation of said selector depressing means for moving the slides unrestrained by said pins; and switches, actuated by the slides that are moved, for controlling a record circuit.

10. In a typewriter for printing, recording and comparing data for use in a tape including control means for selectively conditioning the typewriter for one of said operations including type bar printing means, power mechanism for operating the printing means and key levers for controlling the operation of said power mechanism; a combination encoding means including parallel code slides each having serrations along the upper edge thereof; means for moving said slides; selector means extending across said slides and each including a selector bar and an associated pin carrier mounted for movement toward and away from said slides; a plurality of means for individually urging the selector bars and the pin carriers

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away from the slides; auxiliary means for yieldably urging the selector bars toward said slides; lift means for supporting the selector bars above said slides; means for transferring the typing action of the key levers to the selector bars to cause one of the latter to seat in the serrations aligned by movement of the slides; means for transferring the typing action of the type bar printing means to the pin carriers to cause one of the latter to seat in the serrations of some of said slides; and means for operatively connecting the selector bars and the power mechanism for operating the printing means.

11. In a typewriter for printing, recording and comparing data for use in a tape including control means for selectively conditioning the typewriter for one of said operations; a code mechanism including a plurality of parallel slides each having code serrations along an edge thereof and selector means extending across said slides including selector bars pin carrying arms associated with said selector bars, said slides being selectively movable endwise to provide one group of aligned serrations across the slides and said selector bars and pin arms being movable into contact with said slides whereby one bar and one pin arm corresponding to a coded character will seat in said group of serrations.

12. In a typewriter for printing, recording and comparing data for use in a tape including control means for selectively conditioning the typewriter for one of said operations; a code mechanism including a plurality of parallel slides each having code serrations in an edge thereof and selector means each corresponding to a character or symbol extending across said slides and each selector means including a pin carrier; and said carrier being movable into contact with all of said slides to cause the pins thereof to seat in the transversely aligned serrations of some of said slides to render the latter immobile when moving force is applied to all of the slides to move those corresponding to the coded character or symbol represented by said selector means.

13. In a typewriter for printing, recording and comparing data for use in a tape including control means for selectively conditioning the typewriter for one of said operations; a combination encoding and decoding mechanism including a plurality of parallel slides each having code serrations in an edge thereof; selector means, each corresponding to a character or symbol, extending across said slides and each including a selector bar and a pin carrier; means for moving said bar to seat in code serrations aligned transversely by adjustment of said slides in decoding; and means for moving said pin carrier to seat in the transversely aligned serrations of some of said slides to render the latter immobile when moving force is applied to all of the slides to move those corresponding to the coded character or symbol represented by said selector means in encoding.

14. In a typewriter for printing, recording and comparing data for use in a tape including control means for selectively conditioning the typewriter for one of said operations; a combination encoding and decoding mechanism including a plurality of parallel slides each having code serrations in the upper edge thereof; selector means, each corresponding to a character or symbol, extending transversely of said slides and movable into contact with the upper edges thereof, each selector means including a pair of pivoted arms, one constituting a selector bar and the other a yieldable pin carrier, one bar of a single selector means seating in the transversely aligned serrations of slides moved in accordance with the code representing the character or symbol with which said single selector means corresponds, and the pins of the carrier of said single selector means seating in the transversely aligned serrations of slides not representative of the character or symbol with which said single selector means corresponds, to render said pin engaged slides immobile.

15. In a typewriter for printing, recording and comparing data for use in a tape including control means

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for selectively conditioning the typewriter for one of said operations, including typing key mechanisms; parallel slides each having code serrations, one group of serrations representing a character or symbol and being adapted for alignment to form a channel across the slides when the latter are selectively moved; pivoted selector bars each corresponding to a character or symbol represented by a typing key mechanism and extending across said slides; vertically movable lift means, including eccentrically mounted lift arms and a lift bar, for supporting the selector bars above said slides; means for moving said bars toward the slides when the lift means moves down whereby one of said selector bars will be lowered into the channel formed by the aligned slide serrations corresponding to the character or symbol represented by said bar; and a separable connection between each bar and its associated typing key mechanism.

16. A typewriter of the character set forth in claim 15 wherein the separable connection includes a pendant on each typing key mechanism; a hook link on each selector bar biased out of engagement with said pendant; a bail common to the hook links of all of said bars; and latching control key means for moving all of said hook links into operative relation with said pendants.

17. In a typewriter for printing, recording and comparing data for use in a tape including control means for selectively conditioning the typewriter for one of said operations, including key means and type bar operating mechanisms controlled thereby, parallel slides each having code serrations, a group of serrations representing a character or symbol, being adapted for alignment to form a channel transversely of the slides when the latter are selectively moved; pivoted selector bars each corresponding to a character or symbol represented by said key means, and extending across said slides; means for yieldably supporting the free ends of said bars; vertically movable lift means, including eccentrically mounted lift arms and a lift bar for holding the selector bars above said slides; and movement transfer means between each key means and each selector bar for moving said bars toward the slides against the resistance of said yieldable support means when the lift means moves down, whereby a key corresponding to a bar entering a channel is operable manually to print a character or symbol corresponding to the code serrations forming said channel.

18. In a typewriter for printing, recording and comparing data for use in a tape including control means for selectively conditioning the typewriter for one of said operations, including key means and type bar operating mechanisms controlled thereby; parallel slides each having code serrations; circuit controlled means, including code designation reading means, for selectively moving the slides to align serrations thereof to provide a transverse channel corresponding to the character or symbol read; selector bars extending across said slides; cyclically operated means for reciprocating the bars whereby one of them will be moved into said channel; means operated by the channel engaging bar for actuating the type bar operating means corresponding to the character or symbol read, and said bar reciprocating means including a clutch, a clutch detent armature for releasing the clutch for a single revolution action and a magnet controlled by said reading means circuit for operating said armature after said slide moving means is actuated.

19. In a typewriter for printing, recording and comparing data for use in a tape including control means for selectively conditioning the typewriter for one of said operations, including key means and type bar operating means controlled thereby; parallel slides each having code serrations; means for reading the code designations; means controlled by said reading means for selectively moving the slides to align serrations thereof to provide a transverse channel corresponding to the character or symbol read; selector means extending across said slides includ-

ing selector bars and pin carriers; means controlled by the operation of said type bar operating means for moving said pin carrier into contact with said slides; means for reciprocating the bars to cause one of them to move into said channel; means operated by the channel engaging bar for actuating the type bar operating means; and detent means engaging said pin carrier moving means to hold the latter against operation by said type bar operating means.

20. In a typewriter for printing, recording and comparing data for use in a tape including control means for selectively conditioning the typewriter for one of said operations including key means and type bar operating means controlled thereby for typing data, the code designations of which are to be recorded; serrated code slides; selector means extending across said slides including selector bars and a pin carrier associated with each selector bar; means operated by the key means for moving the selector bars into engagement with said slides; means actuated by the type bar operating means for moving the pin carriers to cause pins thereof to engage said slides; means for disabling said selector bar moving means; detent means for blocking operation of said pin carrier moving means; and said disabling means being operable to move the pin carrier detent to unblocking position when said disabling means is operated.

21. In a typewriter for printing, recording and comparing data for use in a tape including control means for selectively conditioning the typewriter for one of said operations including keyboard means and type bar operating means controlled thereby for typing data, the code designations of which are to be recorded; code mechanism including serrated code slides; selector means extending across said slides including selector bars and a pin carrier for each selector; lift means including eccentric lift arms and a connecting lift bar for supporting said selector bars; means for vertically reciprocating said lift means, including a cyclically operated one revolution clutch, for moving said selector bars into and out of contact with said slides; a clutch detent armature; circuit means for operating the armature to release the clutch for operation; an actuator, including a clutch stop, for operating the armature detent independently of said circuit means; means for transferring movement to the selector bars from the keyboard means; means for transferring movement to the pin carriers from the type bar operating means; means for disabling one of the transfer means and enabling the other transfer means, including a crank, a pin on one of said lift arms and a latch link pivoted to said crank; actuator cam means for engaging the pin and the latch link whereby the latter operates the crank when the associated lift arm operates; and an adjustable interponent for controlling the operation of said disabling and enabling means through said crank.

22. In a typewriter for printing, recording and comparing data for use in a tape including control means for conditioning the typewriter for a selective one of said operations; code mechanism including serrated code slides; means, including an operating circuit and a reading circuit, for moving said slides; switch means for con-

necting said circuits for simultaneous operation of said slide moving means; key means for operating said switch means to condition said circuits for selective operation of said slide moving means; recording circuit means controlled by the operation of said selectively operated slide moving means, and a switch operated by said key means for breaking the circuit of said recording means when the reading circuit is conditioned for simultaneous operation of said slide moving means.

23. In a typewriter for printing, recording and comparing data for use in a tape including control means for selectively conditioning the typewriter for one of said operations, including a keyboard and type bar operating means controlled thereby; parallel code slides; means for moving said slides simultaneously; recording circuit switches closed by the slides that are moved; pivoted carriers extending transversely of said slides; yieldably mounted pins in said carriers for engagement with certain of the serrations in said slides to hold the engaged slides against movement by said slide moving means, and means controlled by said type bar operating means for moving said carriers toward said slides.

24. A typewriter for printing, recording and comparing data, for use in a tape, having control means for selectively conditioning the typewriter for one of said operations including; parallel serrated code slides, selector bars extending across said slides, pin carrier arms pivoted to said selector bars and adapted to be lowered into aligned serrations in the code slides along with said selector bars, means for holding said selector bars in an elevated position above said code slides, type key lever and bar actions for printing operation, type bar bell crank operated means for lowering said pin arms independently of said selector bars into the code slides, pin means operated by the type key levers for lowering said selector bars into the code slides, hook means on said selectors bars for operating said type key lever and bar actions in accordance with the movement of said selector bars into said code slides, key set means for selectively enabling said bell crank operated means, said pin means and said hook means for conditioning the machine for recording, for comparing and for printing respectively; slide moving means including magnet means, circuits for the latter including recording and reading means; and switches actuated by said control means for controlling said circuits.

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